GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL

[ ] REVISION NO. ____

Project No. E-23-656 DATE: 5/20/81

Project Director: Dr. Charles E. S. Ueng School/~~Xxxxx~~ ESM

Sponsor: SME Manufacturing Engineering Education Foundation misc

Type Agreement: Research Award to support Grant Proposal No. 4-81-213

Award Period: From 5/1/81 To 5/1/82 (Performance) _____ (Reports)

Sponsor Amount: $4,000 Contracted through: ~~GTRI~~/GIT

Cost Sharing: $1,200 (E-23-345)

Title: New Manufacturing Process by Superplastic Forming

ADMINISTRATIVE DATA OCA CONTACT Faith G. Costello

1) Sponsor Technical Contact: Mr. Richard Vogelei, Executive Director, SME International Headquarters, One SME Drive, P. O. Box 930, Dearborn, MI 48128

2) Sponsor Admin./Contractual Contact: Dr. Warren W. Worthley, Foundation Director, Society of Manufacturing Engineers, One SME Drive, P. O. Box 930, Dearborn, Michigan 48128 (313) 271-1500

Reports: See Deliverable Schedule Security Classification: N/A

Defense Priority Rating: N/A

RESTRICTIONS

See Attached _____ Supplemental Information Sheet for Additional Requirements

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with N/A

COMMENTS:

COPIES TO:

Administrative Coordinator
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Other: _____

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION SHEET

Date 9/25/81

Project Title: New Manufacturing Process by Superplastic Forming

Project No: E-23-656

Project Director: Dr. Charles E. S. Ueng

Sponsor: SME Manufacturing Engineering Education

Effective Termination Date: 9/1/81

Clearance of Accounting Charges: 9/1/81

Grant/Contract Closeout Actions Remaining:

- [x] Final Invoice ~~and Closing Documents~~
- [ ] Final Fiscal Report
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Assigned to: Engineering Science & Mechanics (School/~~Laboratory~~)

COPIES TO:

Administrative Coordinator	Research Security Services	EES Public Relations (2)
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Accounting	Legal Services (OCA)	Project File
Procurement/EES Supply Services	Library	Other _____

FORM OCA 10:781

A Brief Summary Report
on
"NEW MANUFACTURING PROCESS BY SUPERPLASTIC FORMING"*

by
Charles E. S. Ueng, Professor
School of Engineering Science and Mechanics
Georgia Institute of Technology
Atlanta, GA 30332

The funding of $4,000 from SME Manufacturing Engineering Education Foundation has helped the preparation of the titled research proposal. The award was used as a seed money for an extensive literature survey in this area and the writing of a proposal, in order to put such new ideas together for carrying out a detailed investigation through a possible grant or contract from a major funding agency.

In this research proposal, two basic questions are proposed: (1) How to control the temperature, pressure and timing during a superplastic forming process? and (2) What are the suitable constitutive equations which can be used in such a problem? Obviously, these two topics are interrelated. A thorough understanding on item (2) is necessary in order to analyze item (1). On the other hand, data obtained from the relation among temperature, pressure and time can help for the establishing of constitutive equations.

On the control of temperature, pressure and timing of a superplastic material during the forming process, one has to understand the physical nature of this type of material why it possesses such exceptional stability in uniaxial tensile deformation, and what are the prerequisite conditions

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*This brief summary is condensed from a research proposal prepared through a grant from SME Manufacturing Engineering Education Foundation, Dr. W. W. Worthely, Director.

for a material to behave like this. Through these, one can start simple experimental work and collect such data for commonly used superplastic materials. The furnace previously constructed for the study of superplastically formed sandwich core can be used for this experiment with some minor modifications.

The purpose on the study of constitutive equations is for optimizing the forming conditions and developing a predictive capability. The available constitutive equations used by metallurgists are largely concerned with the detailed atomistic dislocation and microstructural mechanisms that control material behavior. Thus, there are separate constitutive equations that refer to distinct mechanisms of deformation. The four major variables involved here are: temperature, stress, strain rate and grain size. It is planned to plot such maps by holding certain variables to be constant, and study the variation of the others. For example, superplastic deformation usually starts at about half the melting temperature T_m. To what extent superplastic forming effect can be improved if the temperature exceeds 0.5 T_m is an interesting and important question. Such maps, known as "deformation mechanism maps", would be of great value in the proposed research program.